REMARKS/ARGUMENTS

In the present Office Action, the Examiner indicated that color photographs and color drawings have been made of record. The Examiner's indication is appreciated.

Reconsideration of the subject application is requested.

In the present Office Action, the Examiner required Applicant to correct any error that may exist in the specification; rejected Claims 1-35 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-19 of U.S. Patent 7,136,522 (hereinafter "Patent '522"); and rejected Claims 1-35 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-18 of U.S. Patent 7,155,068 (hereinafter "Patent '068").

In this response, Applicant presents various amendments and remarks believed to remedy the Examiner's objections and rejections, and place the claims in condition for allowance.

Claims 1-36 remain in the application.

Amendments to the Specification

As required by the Examiner, Applicant has reviewed the specification and spotted a clerical error in Paragraph [0151]. Applicant has amended the phrase "Eq. (2)" to "Eq. (16)".

The Subject Embodiments

The subject embodiments provide a method and an apparatus of processing a plurality of source images. First, plural source images are spectrally-encoded in a composite image which is rendered in a physical form. A normalized version of an encoded source image from the rendered composite image is then recovered. In other words, the recovered source image is made distinguishable as a normalized color

image. More specifically, the method comprises a step of encoding first and second separation images representing a polychromatic source image in a composite image; a step of rendering the composite image on a substrate by use of a plurality of colorants; and a step of recovering the encoded separation images from the rendered composite image, such that the polychromatic source image is made distinguishable as a normalized color image. The recovering is completed by subjecting the rendered composite image to an illuminant having a predefined spectral power distribution that is selected to reveal the normalized color image.

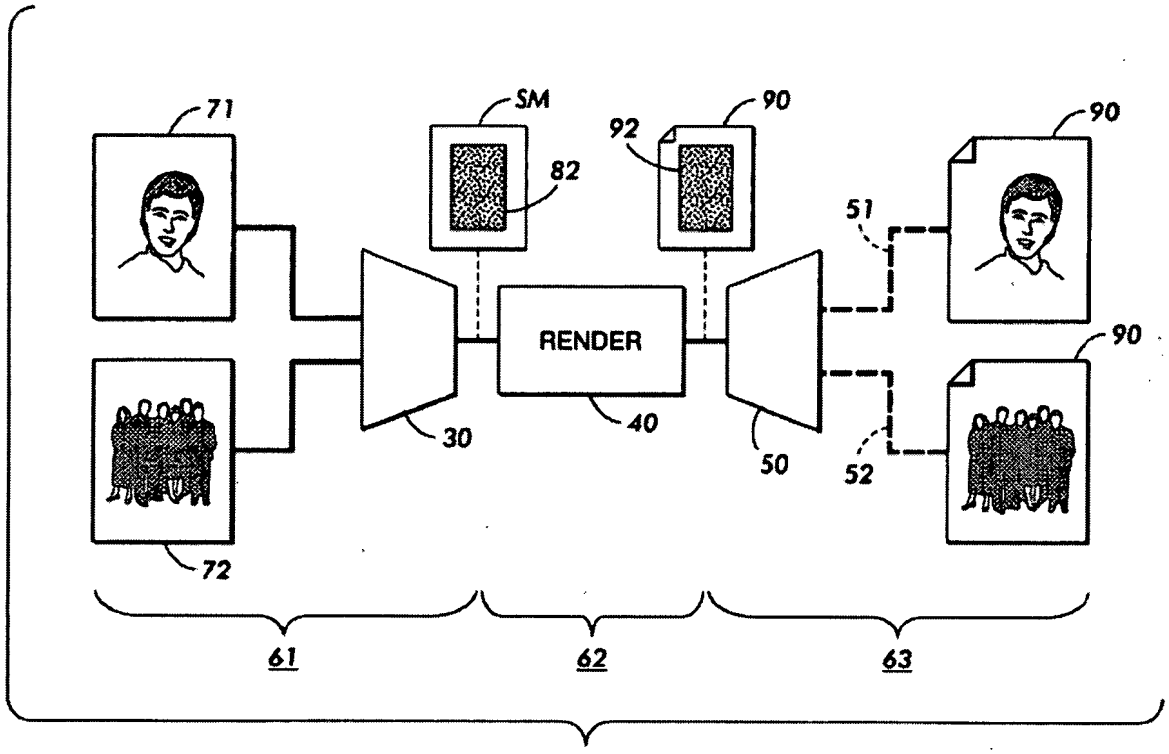

FIG. 4

As illustrated in FIG. 4, the exemplary embodiment includes the spectral multiplexing method 61, rendering method 62, and spectral demultiplexing method 63. In step 61 for multiplexing plural source images, image data representing a source image in a first source image 71 and a second source image 72 are provided to the multiplexer 30, which outputs a composite image data file to a rendering device 40. The output of the rendering device 40 is substrate 90 which has incorporated therein a composite image 92.

The first source image 71 is provided in the form of a polychromatic source image and secondary image data is formed to describe at least two color separation images derived from the first source image, for rendering respectively using first and second colorants; for example, a cyan colorant and a magenta colorant may be suitable choices.

The second source image 72 may be provided in the form of either a monochromatic or a polychromatic source image and secondary image data is formed to describe at least one color separation image derived from the second source image, for rendering respectively using a third colorant; for example, a yellow colorant may be a suitable choice.

In a rendering step 62, the resulting composite image 82 is used to specify patterns in the cyan, magenta, and yellow colorants that are accordingly rendered on a substrate 90 to form the rendered composite image 92.

In step 63 for demultiplexing the rendered composite image 92, the substrate 90 having the rendered composite image 92 fixed thereon is illuminated by the demultiplexer 50. Controlled illumination of the substrate 90 according to a first mode 51 of illumination causes the first and second separation images corresponding to the first source image 71 to achieve a particular level of density with respect to the remainder of the composite image and thus a normalized version of the first (polychromatic) image 71 becomes detectable on the substrate 90.

Controlled illumination of the substrate 90 according to a second mode 52 of illumination causes the third separation image corresponding to the second source image 72 to be similarly detectable on the substrate 90.

In the illustrated embodiments, the first source image 71 and the second source image 72 are therefore selectably distinguishable on the substrate 90. Controlled illumination of the substrate 90 according to operation of at least one of first and second modes 51, 52 thereby causes both the corresponding one of the first separation image 71 and the second separation image 72 to be distinguishable. Such operation of the first mode 51 is thus advantageous, for example, in recovering a normalized color image.

The embodiments can be used in visual stimulation and amusement in printed materials such as books or posters; in disseminating news, entertainment, or

advertising in cinemas, galleries, museums, commercial venues, and trade shows; in publications, merchandising, or advertising vehicles such as newspapers, periodicals, or maps; in the implementation of specialized visual effects in a public setting where there is control of the ambient lighting such as theaters, night clubs, and sporting events; in secure verification of authenticity of a document or other instrument; and in textiles and garments, among others.

Original Claims 1 and 11

There are two independent claims in the application.

Claim 1: A method of processing a plurality of source images, comprising:

receiving image data representative of **a polychromatic source image** and encoding **first and second separation images representing the polychromatic source image** in a composite image;

rendering the composite image on a substrate by use of a plurality of colorants; and **recovering the encoded separation images** from the rendered composite image, such that **the polychromatic source image is made distinguishable as a normalized color image**, by subjecting the rendered composite image to an illuminant having a predefined spectral power distribution that is selected to reveal the normalized color image.

Claim 11: An imaging system, comprising:

a spectral multiplexer for receiving image data representative of **a polychromatic source image** and for processing the image data to encode at least **first and second separation images representing the polychromatic source image** in a composite image, and for providing a composite image data signal;

an image rendering device which is responsive to the spectral multiplexer for receiving the composite image data signal and for rendering the composite image on a substrate; and

a spectral demultiplexer for subjecting the rendered composite image on the substrate to illumination by an illuminant having a predefined spectral power distribution

for which the polychromatic source image was encoded, such that **a normalized color image** derived from one of the encoded source images is recovered when the rendered composite image is subjected to the illuminant.

As highlighted, both claims 1 and 11 are limited by the combination of the following elements:

(1) a polychromatic source image;

(2) first and second separation images representing the polychromatic source image (1); and

(3) (After coding and decoding) recovering the encoded separation images; and presenting the polychromatic source image as a normalized color image.

Patentability of Claims 1 and 11

In the present application, the aforementioned three-element combination is sufficiently taught and disclosed. For example, the specification defines the term "polychrome/polychromatic image" in Paragraph [0068], which is understood as including multiple channels with corresponding color interpretations; for example, RGB. A perceived image is generally described as being polychromatic if it has perceived variations in hue. The specification teaches the spectral encoding of a polychromatic source image and its recovery as a normalized color image. (From Paragraph [0156] to Paragraph [0167]) The specification also teaches the determinations of gamut mapping, dynamic range, and colorant interaction for optimized recovery of the normalized color Image. (From Paragraph [0168] to Paragraph [0191]) Moreover, the specification teaches the image-dependant mapping for improved dynamic range in a normalized color image. (From Paragraph [0192] to Paragraph [0201])

FIG. 4 is a schematic diagram for spectrally multiplexing first and second source images in a composite image, rendering the composite image with use of plural colorants, and for demultiplexing the rendered composite image. FIG. 7 is a rendered composite image including a first (polychromatic) source image encoded primarily in magenta and cyan colorants and a second source image encoded as a monochromatic image in yellow colorant. In Fig. 7, a normalized version of the first source image

becomes perceptible as a normalized color image when the rendered composite image is subject to a first illuminant having a predefined spectral power distribution in the red and green wavelength bands. Alternatively, the second source image becomes perceptible when the rendered composite image is subject to a second illuminant having a predefined spectral power distribution in the blue wavelength band.

Patent '522 does not teach or suggest the three-element combination, not to mention claim it.

In explaining the term "image plane", patent '522 simply mentioned that it is a two-dimensional representation of image data, and the uppercase letters C, Y, M, K are used to indicate two-dimensional arrays of values representing a monochromatic image or a separable component of a polychromatic (multicolor) image. (See Lines 42-50, Column 8) Essentially, Patent '522 does not touch on the polychromatic source image in the entire specification. Patent '522 does not even suggest the "first and second separation images representing the polychromatic source image" and the "recovering ... as a normalized color image".

Like patent '522, patent '068 does not teach or suggest the three-element combination, let alone to claim it.

In explaining the term "image plane", patent '068 simply mentioned that it is a two-dimensional representation of image data, and the uppercase letters C, Y, M, K are used to indicate two-dimensional arrays of values representing a monochromatic image or a separable component of a polychromatic (multicolor) image. (See Lines 38-46, Column 9) Essentially, Patent '068 does not touch on the polychromatic source image in the entire specification. Patent '068 does not even suggest the "first and second separation images representing the polychromatic source image" and the "recovering ... as a normalized color image".

Applicant respectfully submits that claims 1 and 11 are patentable over patent '522, patent '068 and the combination thereof.

Patentability of All Other Claims

All other claims depend directly or indirectly from either Claim 1 or Claim 11, and they are therefore all patentable.

Conclusion

Given the foregoing arguments, Applicant asserts that the rejection has been fully responded to and overcome. All pending claims are patentable. Therefore, Applicant respectfully requests that a Notice of Allowance be issued in this application.

Respectfully submitted,

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9/6/07
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